Unit 3
Day 3
Dividing Complex Numbers
"Some Good Problems" Instruction

Simplify.

1) $\frac{3i}{2-6i} \cdot \frac{2+6i}{2+6i} = \frac{6i-18}{4+36} = \frac{6i-18}{40}$

$\frac{-18+6i}{40} = \frac{-9+3i}{20}$

$= \frac{-18}{40} + \frac{6i}{40}$

$= -\frac{9}{20} + \frac{3i}{20}$

$= -\frac{9}{20} + \frac{3}{20}i$

Simplify.

2) $\dfrac{5-i}{3+7i} \cdot \dfrac{3-7i}{3-7i} = \dfrac{15-35i-3i-7}{9+49}$

$= \dfrac{8-38i}{58}$

$= \dfrac{4}{29} - \dfrac{19}{29}i$

Simplify.

3) $\frac{5-3i}{1+2i} \cdot \frac{2-4i}{1+i}$ $= \frac{10-20i-6i-12}{1+i+2i-2}$

$= \frac{-2-26i}{-1+3i} \cdot \frac{-1-3i}{-1-3i}$

$= \frac{2+6i+26i-78}{1+9} = \frac{-76+32i}{10}$

$-\frac{38}{5} + \frac{16i}{5}$

Simplify.

4)

$$\frac{2-i}{1+6i}+\frac{3+2i}{1-6i} = \frac{2-i}{1+6i}\cdot\frac{1-6i}{1-6i} + \frac{3+2i}{1-6i}\cdot\frac{1+6i}{1+6i}$$

$$= \frac{2-12i-i-6}{1+36} + \frac{3+18i+2i-12}{1+36}$$

$$= \frac{-4-13i}{37} + \frac{-9+20i}{37}$$

$$= \frac{-13+7i}{37} = \boxed{\frac{-13}{37}+\frac{7i}{37}}$$

Simplify.

5) $\dfrac{3+i}{4+3i} - \dfrac{5-2i}{4-3i}$

$= \dfrac{3+i}{4+3i} \cdot \dfrac{4-3i}{4-3i} - \dfrac{5-2i}{4-3i} \cdot \dfrac{4+3i}{4+3i}$

$= \dfrac{12-9i+4i+3}{16+9} - \dfrac{20+15i-8i+6}{16+9}$

$= \dfrac{15-5i}{25} + \dfrac{-26+7i}{25} = \dfrac{-11-12i}{25}$

$= \dfrac{-11}{25} + \dfrac{-12i}{25}$

7)

Find any restrictions on a and b so that $(3a+5bi)^2$ is pure imaginary? Pure real?

$(3a+5bi)(3a+5bi)$

$9a^2+15abi+15abi-25b^2$

$9a^2+30abi-25b^2$

$9a^2=25b^2$

$\frac{a^2}{b^2}=\frac{25}{9}$ $\frac{a}{b}=\pm\frac{5}{3}$

Pure ~~Real~~

$a=0$ OR $b=0$

8)

Use the definition of equality for complex numbers to solve the following equations for real numbers a and b.

$$2a - 3(2+i) = -3bi + 5(a+1)$$

homework: Day 3 hmk + Some Good Problems (ALL)